CLAIMS

What is claimed:

1. In a multi-layer polyolefin film, the combination comprising:

a. a surface layer of said film comprising a thermoplastic polymer capable of forming an effective heat seal with a corresponding thermoplastic polymer upon heating to an elevated temperature and compression; and

b. a core layer contiguous to said surface layer, said core layer having a thickness greater than said surface layer, said core layer formed of ethylene-propylene copolymer having an isotactic structure and containing ethylene in an amount of no more than about one weight percent which is effective to provide an inter-layer bond strength with said surface layer which is at least about 15 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

2. The combination of claim 1, wherein said core layer has an average thickness within the range of about 5 microns to 150 microns and said surface layer has a thickness within the range of about 0.3 microns to 80 microns, said surface layer having a thickness less than said core layer.

3. The combination of claim 1, wherein said inter-layer bond strength between said surface layer and said core layer is at least about 50 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

4. The combination of claim 1, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.05 weight percent and about 0.8 weight percent.

5. The combination of claim 1, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.3 weight percent and about 0.5 weight percent and wherein said inter-layer bond strength between said surface layer and said core layer is at least about 30 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

6. The combination of claim 1, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.1 weight percent and about 0.2 weight percent.

7. The combination of claim 3, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.5 weight percent and about 0.7 weight percent.

8. The combination of claim 1, further comprising:

c. a third layer of said polyolefin film contiguous to said core layer and not contiguous to said surface layer, said third layer comprising a polymer.

9. The combination of claim 8, wherein said third layer comprises a thermoplastic polymer capable of forming an effective heat seal with a corresponding thermoplastic film upon heating to an elevated temperature and compression.

10. The combination of claim 8, wherein said third layer constitutes a second surface layer capable of forming an effective heat seal with said surface layer upon heating to an elevated temperature and compression.

11. The combination of claim 1, wherein said multi-layer film is oriented in at least one direction.

12. The combination of claim 1, wherein said multi-layer film is biaxially oriented.

13. In a process for producing a multi-layer film of enhanced inter-layer bond strength, the combination comprising:

a. providing a first polymer of said film comprising a thermoplastic polymer capable of forming an effective heat seal with a corresponding thermoplastic film upon heating to an elevated temperature and compression;

b. providing a second polymer formed of ethylene-propylene copolymer having an isotactic structure; and,

c. coinjecting said first and second polymers through a slotted die system to form a film formed of a surface layer of said first polymer and a core layer of said second polymer, wherein said second polymer contains ethylene in an amount of no more than about one weight percent which is effective to provide an inter-layer bond strength between said core layer and said surface layer which is at least about 15 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

14. The process of claim 13, wherein said inter-layer bond strength between said surface layer and said core layer is at least about 50 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

15. The process of claim 13, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.05 weight percent and about 0.8 weight percent.

16. The process of claim 13, wherein said second polymer contains ethylene in an amount between about 0.3 weight percent and about 0.5 weight percent and wherein said inter-layer bond strength between said surface layer and said core layer is at least about 30 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

17. The process of claim 13, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.1 weight percent and about 0.2 weight percent.

18. The process of claim 14, wherein said core layer formed of ethylene-propylene copolymer contains ethylene in an amount between about 0.5 weight percent and about 0.6 weight percent.

19. The process of claim 13, further comprising the step of stretching said film in at least one direction to form an oriented film after said coinjecting step.

20. The process of claim 19, wherein said step of stretching said film in at least one direction comprises stretching said film in the machine direction further comprising the additional step after stretching said film in the machine direction of stretching said film in the transverse direction while heating said film above 120°C, producing a biaxially-oriented multi-layer polyolefin film.

21. The process of claim 13, further comprising the step of providing a third polymer of said film.

22. The process of claim 21, wherein said coinjecting step further comprises coinjecting said third polymer with said first and second polymers through a slotted die system to form a film formed of a first surface layer formed of said first polymer, a core layer formed of said second polymer contiguous to said first surface layer, and a second surface layer formed of said third polymer contiguous to said core layer and not contiguous to said first surface layer.

23. The process of claim 22, wherein said third polymer is a thermoplastic polymer capable of forming an effective heat seal with a corresponding thermoplastic film upon heating to an elevated temperature and compression.

24. The process of claim 22, wherein said second surface layer and said first surface layer are formed of the same material, wherein said second surface layer is capable of forming an effective heat seal with said first surface layer upon heating to an elevated temperature and compression.

25. In a process for producing a multi-layer film of enhanced inter-layer bond strength, the combination comprising:

a. providing a first polymer of said film comprising a thermoplastic polymer capable of forming an effective heat seal with a corresponding thermoplastic film upon heating to an elevated temperature and compression;

b. providing a second polymer formed of ethylene-propylene copolymer having an isotactic structure; and,

c. injecting said second polymer through a slotted die system to form a film;

d. stretching said film in at least one direction to form an oriented film; and

e. extrusion coating at least one side of said film with said first polymer, forming a surface layer of said first polymer and a core layer of said second polymer, wherein said second polymer contains ethylene in an amount of no more than about one weight percent which is effective to provide an inter-layer bond strength between said core layer and said surface layer which is at least about 15 percent greater than the inter-layer bond strength between said surface layer and a film formed of isotactic polypropylene homopolymer.

26. The process of claim 25, further comprising the additional step after said extrusion coating step of stretching said film in the transverse direction while heating said film above 120°C, producing a biaxially-oriented multi-layer polyolefin film.